A Different Approach to Pavement Economics

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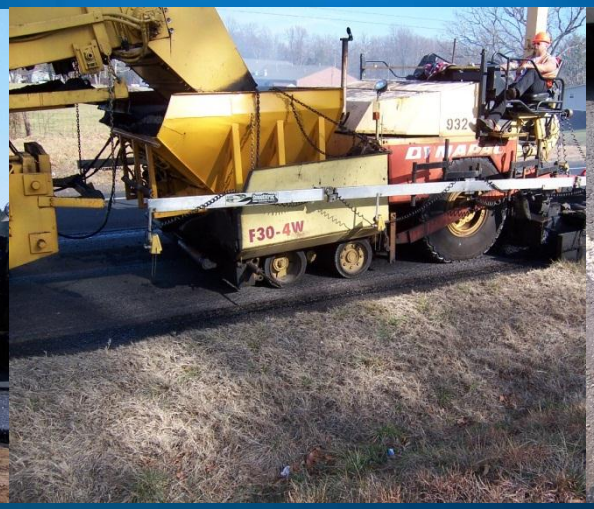
Economics

- Economics is defined as –
  - The study of the production and consumption of **goods** and the **transfer of wealth** to produce and obtain those goods.

- How do Pavements tie in?
  - They are the “goods”.
  - Taxes and other user fees are “the transfer of wealth”.

Pavement Economics

- The Four Phases of a Pavement's Life:
  - Initial Construction
  - Functional Improvements
  - Structural Improvements
  - **End of Service Life (Pavement Death)**



End of Service Life (Pavement Death)

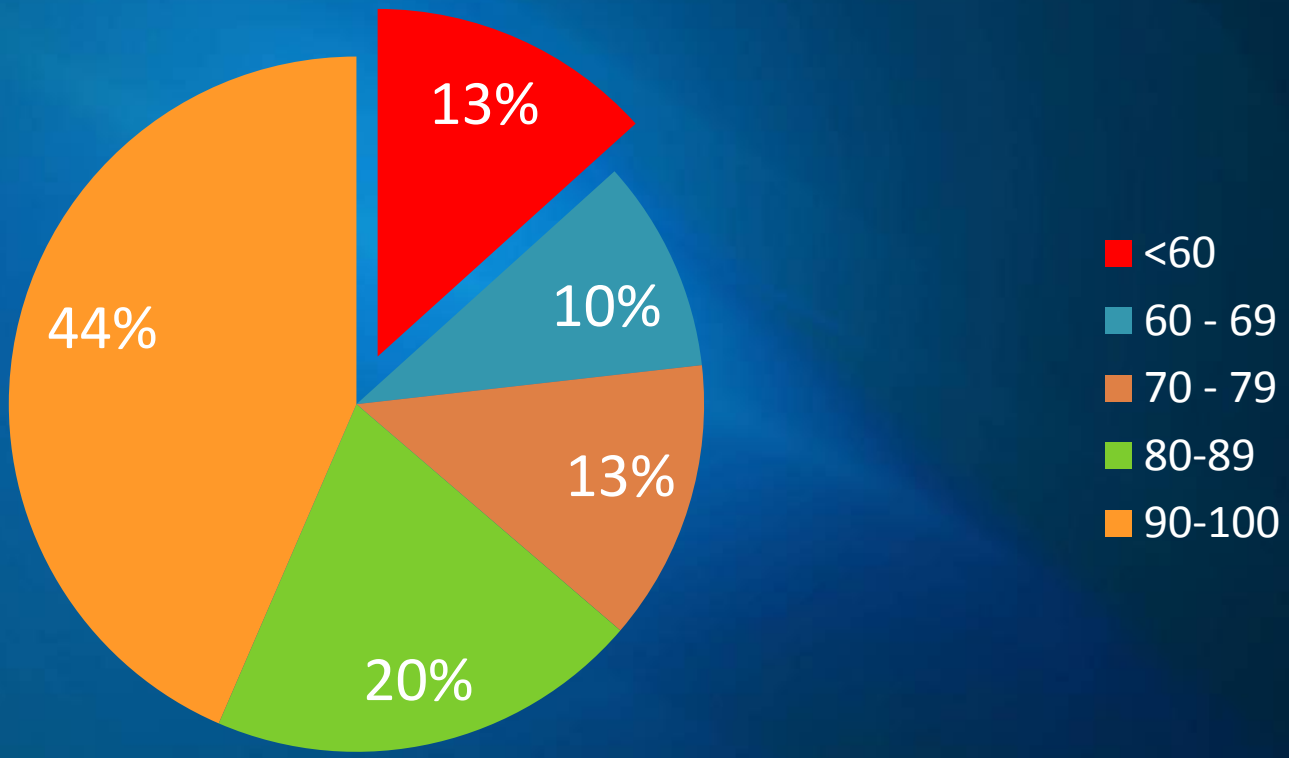
- ***Fact - Most pavements never really "die"!***
- They are seldom removed from service at the end of their service life.
- Many are kept on "life-support" with short-term fixes.
- Some become part of the foundation for "new" pavements.
- A few are reconstructed through major rehabilitation and/or reconstruction (sometimes in-place).

Maintaining the Pavements we have

- VDOT has Numerous Challenges
  - 4,500 lane miles of asphalt surfaced interstate pavements.
  - Over 22,000 lane miles of asphalt surfaced primary pavements.
  - Approximately 50,000 lane miles of asphalt surface secondary roads.
  - A set goal of keeping 82% of all its pavements in acceptable condition.
  - Very limited funding.

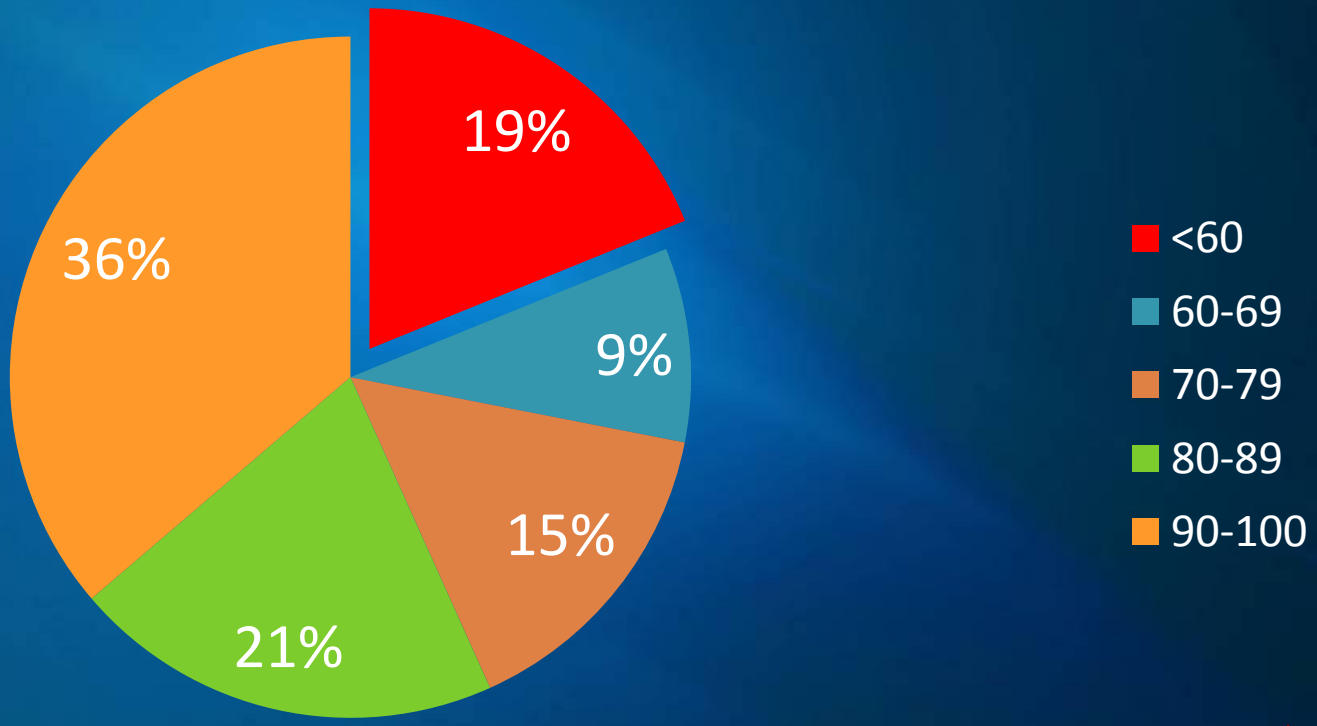
The Good News

2012 Interstate Condition Data - AC Surfaces Only

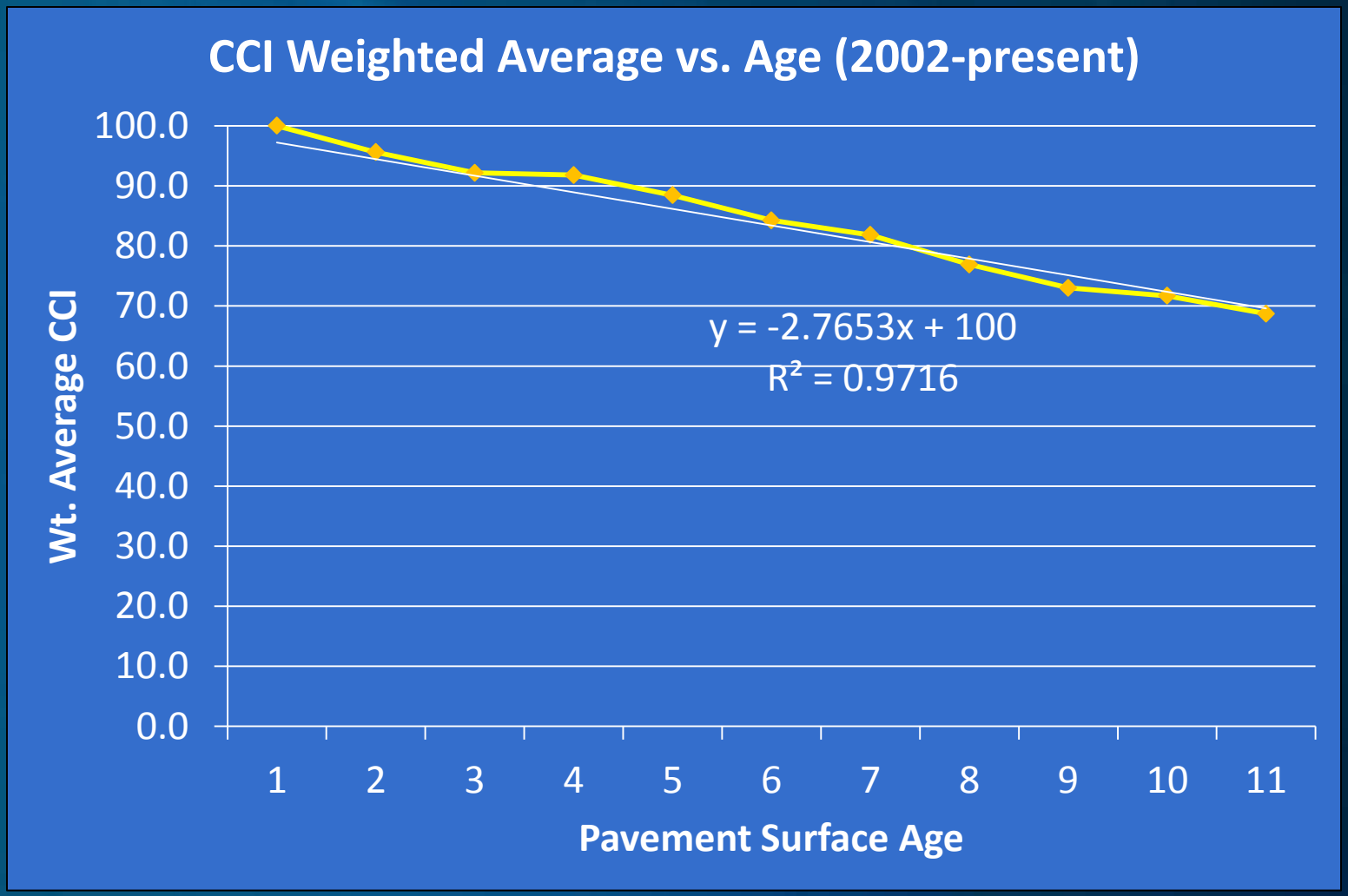


More Good News

2012 Primary Condition Data - AC Surfaces Only



Performance of Primary Route AC Mixes



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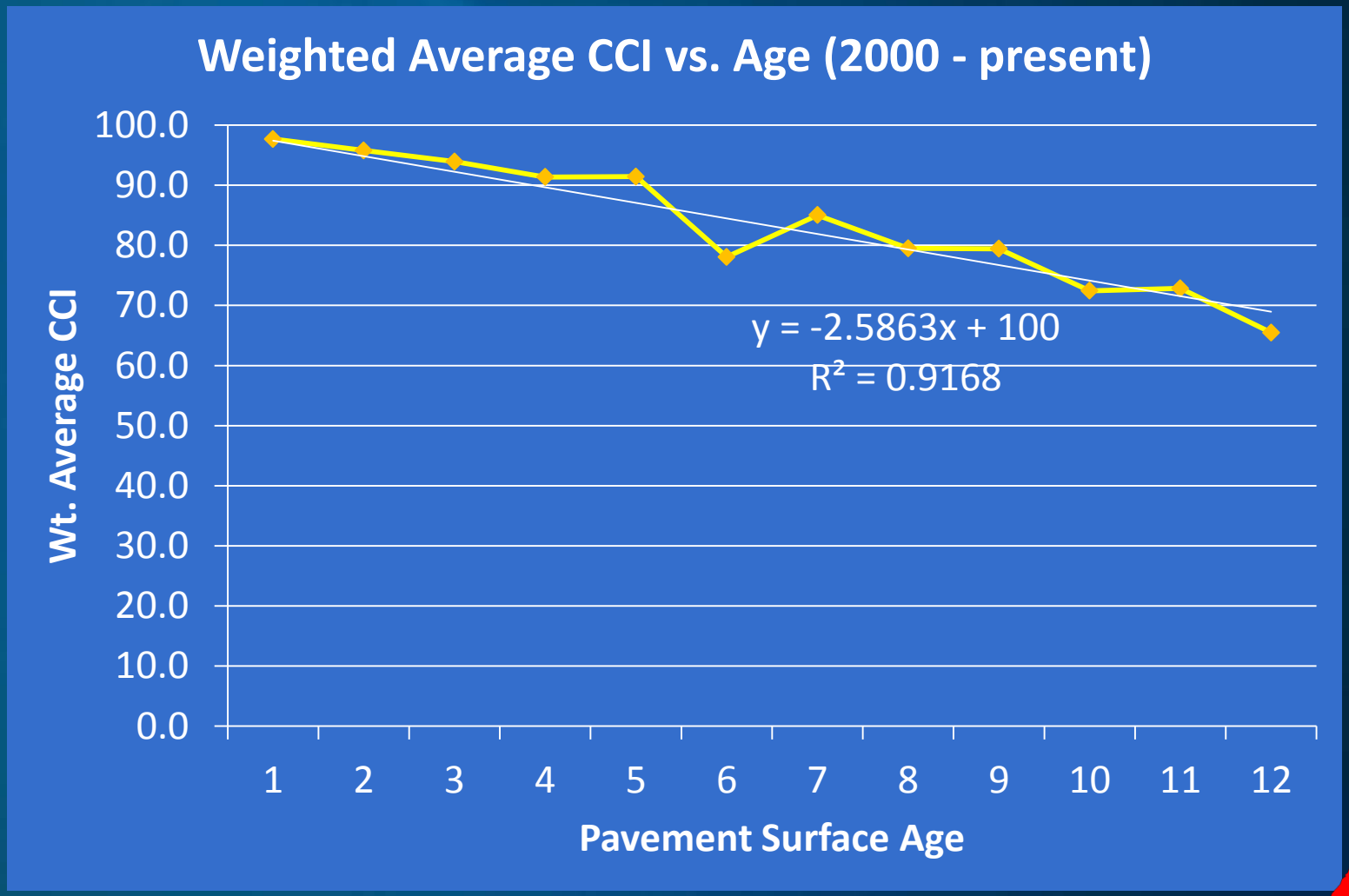
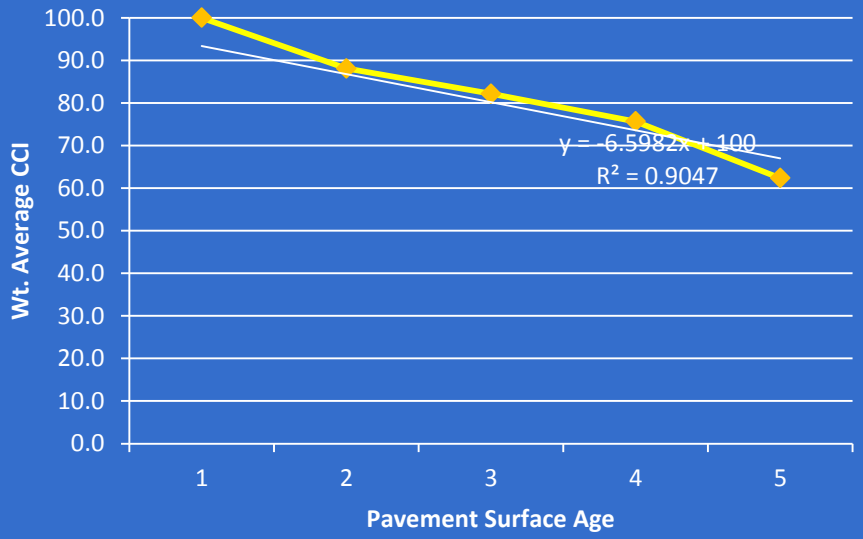
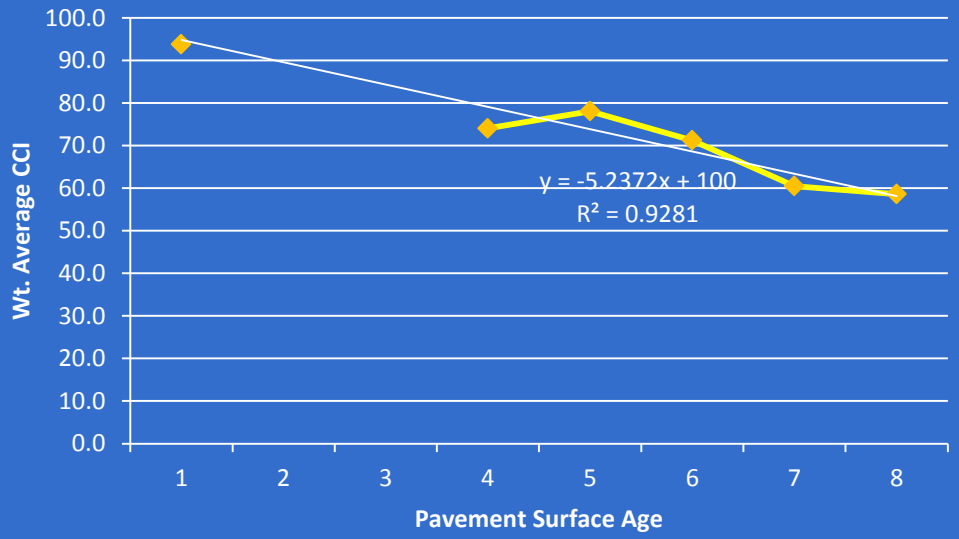


Performance of Slurry Seal & Microsurfacing





2012 Condition Analysis Summary

- **Interstate AC mixes** placed since 2000 have an average life to a CCI = 60 of **15.5 years**.
- **Primary route AC mixes** placed since 2002 have an average life to a CCI = 60 of **15 years.**
- Interstate latex/slurry seal have an average life to a CCI = 60 of 7.6 years.
- Primary route latex/slurry seal have an average life to a CCI = 60 of 6 years.

Policy Questions

- What is the desired resurfacing cycle for each system – 12 years, 15 years, 20 years?
- How should pavement preservation practices (slurry seals/latex and thin AC overlays) be incorporated to maximize service life?
- What is the best way to address structurally deficient pavements – deep mill and replace, pavement recycling, reconstruction?

Pavement Economics Scenario

- 15 Year Resurfacing Cycle for all Systems
- 1.5” functional improvement overlay
- 5,100 lane miles of overlay per year
- 3.2 million tons of AC surface mix required
- At current price approximately $270 million required AC surface mixes only
- $18.7 million additional funds needed to mill all Interstates and Primary routes before paving.

What are the Impacts?

- Funding set to meet 15 year cycle results in 6.7% deficient pavements on interstate and primary routes.
- Virginia interstate and primary pavement deficiencies are currently 13% and 19% respectively.
- ***Mix deterioration rate matches funding cycle when proper mixes are used.***

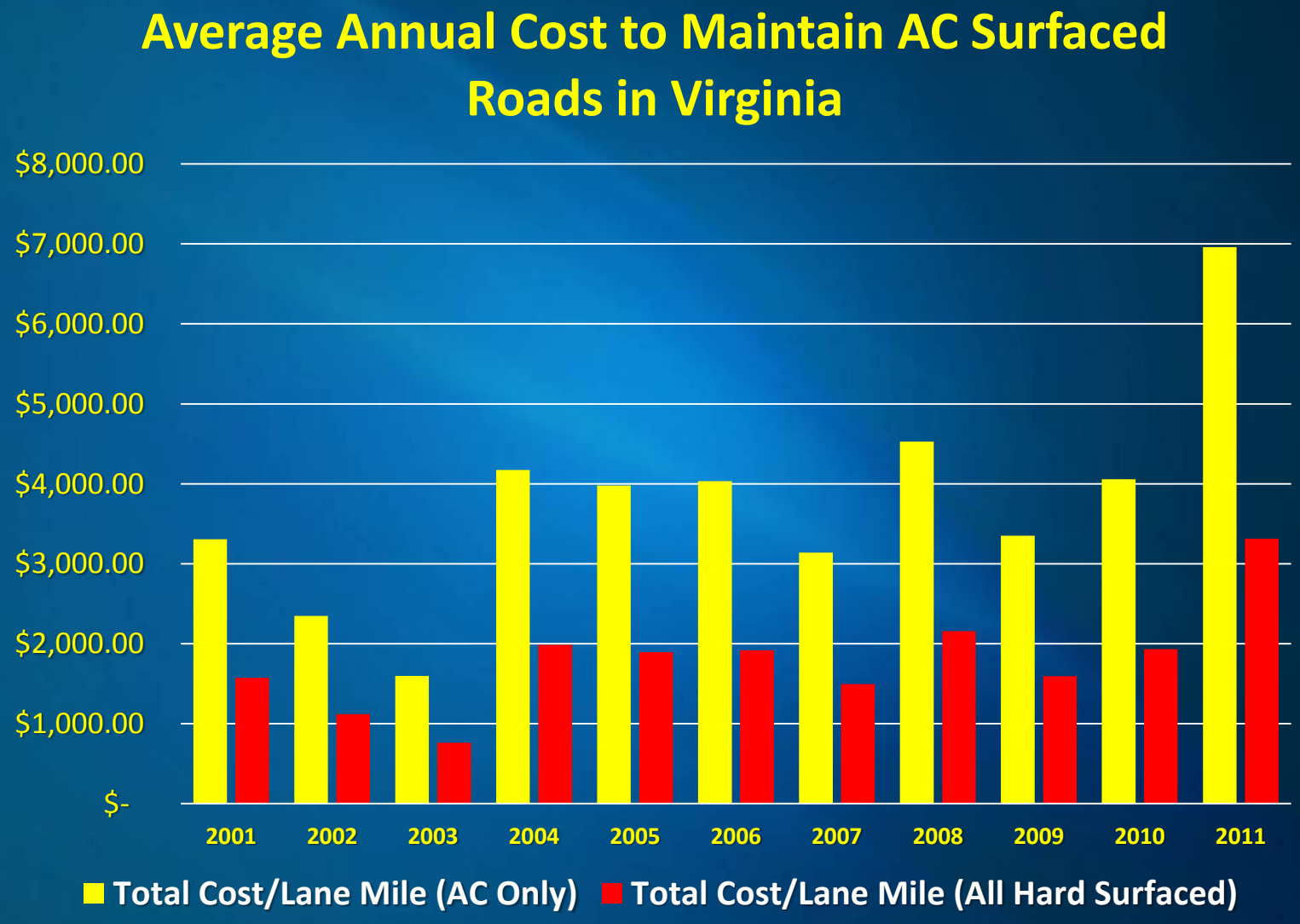
What are the Impacts?

- Preventive maintenance treatments can be used to extend life when used properly.
- Proper use is a function of surface condition and timing.
- Too early in the service life of an AC surface is a waste of funds with no improvement.
- Too late results in a Band-Aid with little extension of service life.
- Pavement marking should be selected based entire service life of materials, not just early years.

What are the Network Costs?

- Numerous activities make up annual cost to maintain VDOT's pavement network.
- These activities can be divided into two broad categories
  - Planned maintenance
  - Unplanned maintenance (i.e., emergency repairs)
- **The following is an analysis of VDOT's pavement network expenditures since 2001**

Historical Cost Per Lane Mile



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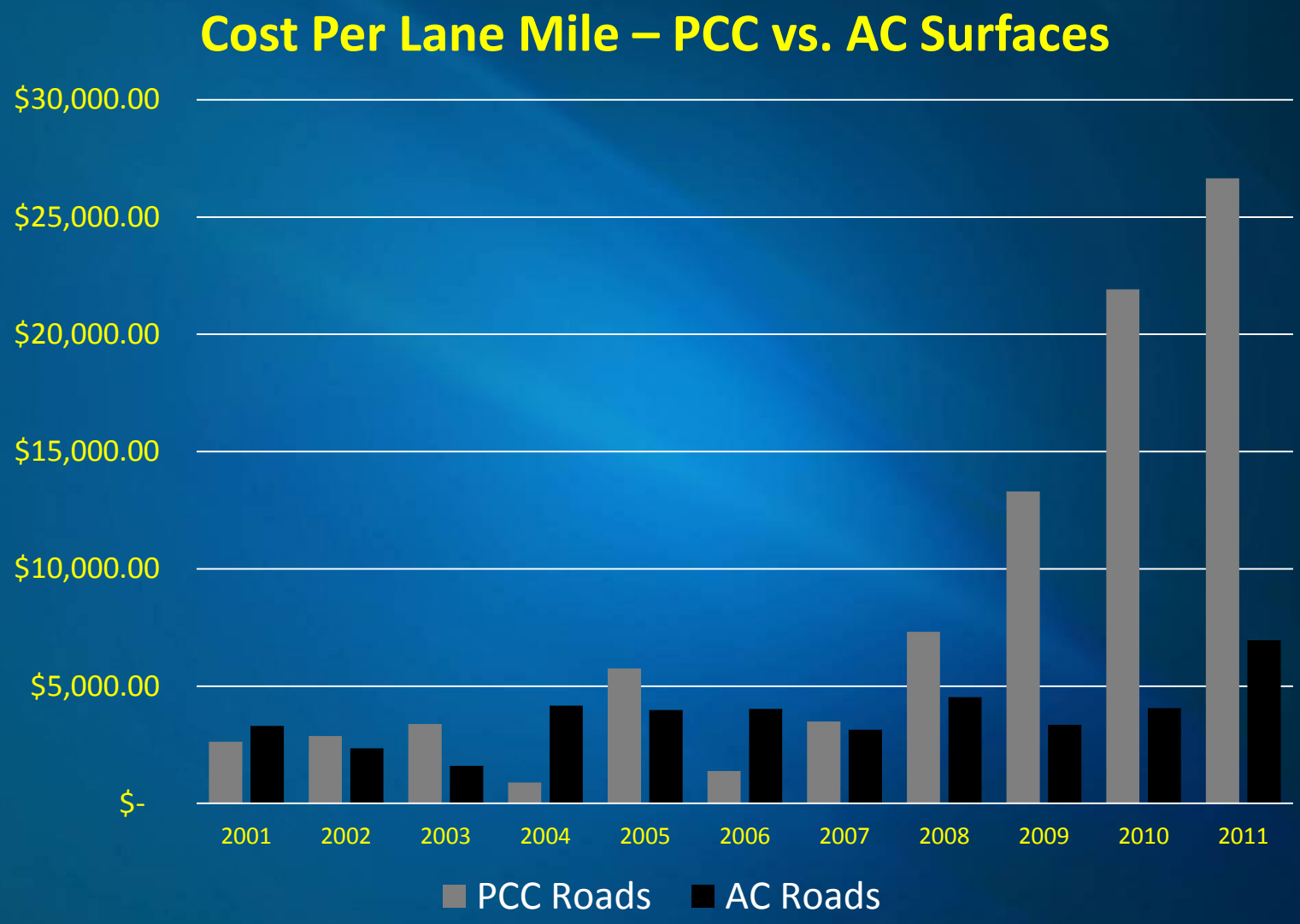

Other Thoughts

- All aged and cracked surfaces should be milled.
  - Thicker is not better, sound structure is better.
  - Brittle older surface layers overlaid have tendency to rut.
- Use rut resistant intermediate mixes (IM-19.0E or SMA-19.0 (76-22)) for deep milling.
- Stronger binders and mixes should be used at intersections with heavy truck use.
- Timing is everything in order for preventive maintenance treatments to extend pavement resurfacing cycle.
- Move forward with recommendations of Asphalt Quality Task Force.

Final Thoughts

- Annual Pavement Maintenance Funding should be a function of Lane Mileage to maintain a 15 year resurfacing cycle.
- Annual funding amount should/will fluctuate as costs change.
- Lane based funding will stabilize pavement conditions.
- Improved paving materials and practices should result in longer service lives.

Questions?